ABSTRACT

The present invention is a sensor formed over a subminiature through hole. Because of the small diameter of the through hole, the material that fills the through hole and the through hole itself have an essentially negligible effect on the sensor. Only a small amount of conductive material which fills each through hole is in contact with each associated electrode. Therefore, the purity of the electrode is not significantly altered by the conductive material coupled to the electrode. A relatively large number of sensors can be formed on the surface of the substrate within a relatively small fluid flowcell. Thus, more information can be attained using less blood. The sensors of the present invention are preferably disposed on an alumina substrate which is essentially impervious to aqueous electrolytes and blood over long periods of storage in potentially corrosive environments. Since the substrate on which the sensors are deposited does not break down or become unstable when exposed over time to such corrosive environments, the isolation that is provided by the substrate remains very high between each sensor and each other sensor, between each sensor and each conduction path, and between each conduction path and each other conduction path. The superior isolation provided by the substrate provides for a high level of accuracy in the sensor of the present invention. Furthermore, the use of the through holes allows the conduction paths between the electrodes of the sensors and any external devices to be exclusively on the opposite side of the substrate from the sample. This physical isolation of the sample from the conduction paths between the sensor electrodes and external devices ensures very high electrical isolation between each of the sensors is maintained over an extended period time during which corrosive fluids (such as electrolytes and/or blood) are present in the flowcell.